

1 CLAIMS.

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3 We claim:

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5 1. A hot melt adhesive composition consisting essentially of:

6 A) from about 40 to 100 percent by weight (based on the final weight of the hot melt
7 adhesive composition) of a homogenous ethylene/α-olefin interpolymer; and

8 B) from 0 to about 60 percent by weight (based on the final weight of the hot melt adhesive
9 composition) of one or more tackifiers.

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11 2. The hot melt adhesive composition of Claim 1 wherein;

12 A) the homogenous ethylene/α-olefin interpolymer is present in an amount of from about 60
13 to about 85 percent by weight (based on the final weight of the hot melt adhesive composition) and the
14 homogenous ethylene/α-olefin interpolymer is characterized by having:

15 i) a density of from about 0.880 to about 0.930 g/cm³;

16 ii) a number average molecular weight (Mn) of from about 1,000 to about 9,000; and

17 iii) a Brookfield Viscosity (measured at 300°F) of from about 500 to about 7,000 cP
18 and

19 B) the one or more tackifiers is present in an amount of from about 15 to about 40 percent by
20 weight (based on the final weight of the hot melt adhesive composition); and wherein

21 C) the hot melt adhesive composition is characterized by having:

22 i) a Brookfield Viscosity (measured at 350°F) of from about 400 to about 2,000 cP;

23 ii) a Peel Adhesion Failure Temperature (“PAFT”) of greater than or equal to 110°F;
24 and

25 iii) a Shear Adhesion Failure Temperature (“SAFT”) of greater than or equal to
26 140°F.

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28 3. The hot melt adhesive composition of Claim 1 wherein;

29 A) the homogenous ethylene/α-olefin interpolymer is present in an amount of from about 65
30 to about 80 percent by weight (based on the final weight of the hot melt adhesive composition) and the
31 homogenous ethylene/α-olefin interpolymer is characterized by having:

32 i) a density of from about 0.890 to about 0.920 g/cm³;

ii) a number average molecular weight (Mn) of from about 1,250 to about 7,000; and
iii) a Brookfield Viscosity (measured at 300°F) of from about 1,000 to about 6,000
cP; and

B) the one or more tackifiers is present in an amount of from about 20 to about 35 percent by weight (based on the final weight of the hot melt adhesive composition); and wherein

C) the hot melt adhesive composition is characterized by:

- i) having a Brookfield Viscosity (measured at 350°F) of from about 500 to about 1,400 cP;
- ii) having a Peel Adhesion Failure Temperature ("PAFT") of greater than or equal to 115°F;
- iii) having a Shear Adhesion Failure Temperature ("SAFT") of greater than or equal to 150°F; and
- iv) exhibiting 100% paper tear at 35°F - 140°F.

4. The hot melt adhesive composition of Claim 1 wherein;

A) the homogenous ethylene/α-olefin interpolymer is characterized by having:

- i) a density of from about 0.895 to about 0.915 g/cm³;
- ii) a number average molecular weight (Mn) of from about 1,500 to about 6,000; and
- iii) a Brookfield Viscosity (measured at 300°F) of from about 1,500 to about 5,000
cP; and

B) the hot melt adhesive composition is characterized by:

- i) having a Brookfield Viscosity (measured at 350°F) of from about 750 to about 1,200 cP;
- ii) having a Peel Adhesion Failure Temperature ("PAFT") of greater than or equal to 120°F;
- iii) having a Shear Adhesion Failure Temperature ("SAFT") of greater than or equal to 170°F; and
- iv) exhibits 100% paper tear at 0°F - 140°F.

5. The hot melt adhesive composition of Claim 1 wherein;

A) the homogenous ethylene/α-olefin interpolymer is characterized by having:

- i) a density of from about 0.893 to about 0.930 g/cm³;
- ii) a number average molecular weight (Mn) of from about 1000 to about 6,000; and
- iii) a Brookfield Viscosity (measured at 300°F) of from about 1,500 to about 5,000 cP; and

5 B) the hot melt adhesive composition is characterized by:

- i) having a Brookfield Viscosity (measured at 350°F) of from about 400 to about 1,400 cP;
- ii) having a Peel Adhesion Failure Temperature (“PAFT”) of greater than or equal to 90°F;
- iii) having a Shear Adhesion Failure Temperature (“SAFT”) of greater than or equal to 200°F.; and
- iv) exhibits 100% paper tear at 140°F.

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14 6. The hot melt adhesive composition of Claim 5 wherein;

15 A) the homogenous ethylene/α-olefin interpolymer is characterized by having:

- i) a density of from about 0.894 to about 0.910 g/cm³;
- ii) a number average molecular weight (Mn) of from about 1100 to about 5,300; and
- iii) a Brookfield Viscosity (measured at 300°F) of from about 1,600 to about 3,200 cP; and

20 B) the hot melt adhesive composition is characterized by:

- i) having a Brookfield Viscosity (measured at 350°F) of from about 700 to about 1,200 cP;
- ii) having a Peel Adhesion Failure Temperature (“PAFT”) of greater than or equal to 90°F;
- iii) having a Shear Adhesion Failure Temperature (“SAFT”) of greater than or equal to 200°F.; and
- iv) exhibits 100% paper tear at 140°F.

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29 7. The hot melt adhesive composition of Claim 4 wherein;

30 A) the homogenous ethylene/α-olefin interpolymer is an interpolymer of ethylene and one or
31 more C₃-C₃₀ α-olefins; and

1 B) the one or more tackifiers is selected from the group consisting of aliphatic hydrocarbon
2 resins, hydrogenated hydrocarbon resins, C₅ aliphatic or aromatic hydrocarbon resins or an aromatically
3 modified C₅ aliphatic or aromatic hydrocarbon resins and combinations thereof; and
4 wherein the adhesive composition is capable of binding a fibrous cellulosic article to an article selected from
5 the group consisting of a fibrous cellulosic article, wood, metal, glass, plastic, and combinations thereof.
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7 8. The hot melt adhesive composition of Claim 4 wherein;

8 A) in the homogenous ethylene/α-olefin interpolymer, the α-olefins is selected from the
9 group consisting of from C₈ (1-Octene); C₁₀ (1-Decene), C₁₂ (1-dodecene), C₁₄ (1-duodecene), C₁₄ (1-
10 tetradecene), C₁₆ (1-hexadecene), C₁₈ (1-octadecene), C₂₀₋₂₄₊, C₂₄₋₂₈ and C₃₀ and combinations thereof; and

11 B) the one or more tackifiers is characterized as having an acid number between 0 to and
12 about 25.8.

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14 9. The hot melt adhesive composition of Claim 5 wherein;

15 A) in the homogenous ethylene/α-olefin interpolymer, the α-olefins is selected from the
16 group consisting of from C₈ (1-Octene); C₁₀ (1-Decene), C₁₂ (1-dodecene), C₁₄ (1-duodecene), C₁₄ (1-
17 tetradecene), C₁₆ (1-hexadecene), C₁₈ (1-octadecene), C₂₀₋₂₄₊, C₂₄₋₂₈ and C₃₀ and combinations thereof; and

18 B) the one or more tackifiers is characterized as having an acid number between 0 to and
19 about 25.8.

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22 10. The hot melt adhesive composition of Claim 12, further comprising one or more compounds chosen
23 from the group consisting of stabilizers, plasticizers, fillers, antioxidants, preservatives, synergists, dyes,
24 and pigments.

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26 11. The hot melt adhesive composition of Claim 8, wherein the α-olefin is selected from the group
27 consisting of 1-octene and propylene.

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29 12. The hot melt adhesive composition of Claim 9, wherein the α-olefin is 1-octene.

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31 13. The hot melt adhesive composition of Claim 8, wherein the copolymer has a molecular weight
32 distribution (Mw/Mn) ranging from about 2.1 – about 2.7.

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2 14. The hot melt adhesive composition of Claim 9, wherein the copolymer has a molecular weight
3 distribution (Mw/Mn) ranging from about 2.1 – about 16.
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5 15. The hot melt adhesive composition of Claim 8, wherein the tackifier is present in an amount of from
6 about 15 to about 35 percent by weight (based on the final weight of the hot melt adhesive composition).
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1 16. A cellulosic article formed using a hot melt adhesive composition, the adhesive composition
2 consisting essentially of;

- 3 A) from about 40 to 100 percent by weight (based on the final weight of the hot melt
4 adhesive composition) of a homogenous ethylene/α-olefin interpolymer; and
5 B) from 0 to about 60 percent by weight (based on the final weight of the hot melt adhesive
6 composition) of one or more tackifiers.

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8 17. The cellulosic article of Claim 16 wherein in the hot melt adhesive composition;

9 A) the homogenous ethylene/α-olefin interpolymer is present in an amount of from about 60
10 to about 85 percent by weight (based on the final weight of the hot melt adhesive composition) and the
11 homogenous ethylene/α-olefin interpolymer is characterized by having:

- 12 i) a density of from about 0.880 to about 0.930 g/cm³;
13 ii) a number average molecular weight (Mn) of from about 1,000 to about 9,000; and
14 iii) a Brookfield Viscosity (measured at 300°F) of from about 500 to about 7,000 cP
15 and

16 B) the one or more tackifiers is present in an amount of from about 15 to about 40 percent by
17 weight (based on the final weight of the hot melt adhesive composition); and wherein

18 C) the hot melt adhesive composition is characterized by having:

- 19 i) a Brookfield Viscosity (measured at 350°F) of from about 400 to about 2,000 cP;
20 ii) a Peel Adhesion Failure Temperature (“PAFT”) of greater than or equal to 110°F;
21 and
22 iii) a Shear Adhesion Failure Temperature (“SAFT”) of greater than or equal to
23 140°F.

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25 18. The cellulosic article of Claim 16 wherein in the hot melt adhesive composition;

26 A) the homogenous ethylene/α-olefin interpolymer is present in an amount of from about 65
27 to about 80 percent by weight (based on the final weight of the hot melt adhesive composition) and the
28 homogenous ethylene/α-olefin interpolymer is characterized by having:

- 29 i) a density of from about 0.890 to about 0.920 g/cm³;
30 ii) a number average molecular weight (Mn) of from about 1,250 to about 7,000; and
31 iii) a Brookfield Viscosity (measured at 300°F) of from about 1,000 to about 6,000
32 cP; and

1 B) the one or more tackifiers is present in an amount of from about 20 to about 35 percent by
2 weight (based on the final weight of the hot melt adhesive composition); and wherein
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4 C) the hot melt adhesive composition is characterized by:

- 5 i) having a Brookfield Viscosity (measured at 350°F) of from about 500 to about
6 1,400 cP;
7 ii) having a Peel Adhesion Failure Temperature (“PAFT”) of greater than or equal to
8 115°F;
9 iii) having a Shear Adhesion Failure Temperature (“SAFT”) of greater than or equal
10 to 150°F; and
11 iv) exhibiting 100% paper tear at 140°F.

12 19. The cellulosic article of Claim 16 wherein in the hot melt adhesive composition;

13 A) the homogenous ethylene/α-olefin interpolymer is characterized by having:

- 14 i) a density of from about 0.893 to about 0.930 g/cm³;
15 ii) a number average molecular weight (Mn) of from about 1,000 to about 6,000; and
16 iii) a Brookfield Viscosity (measured at 300°F) of from about 1,500 to about 5,000
17 cP; and
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19 B) the hot melt adhesive composition is characterized by:

- 20 i) having a Brookfield Viscosity (measured at 350°F) of from about 400 to about
21 1,400 cP;
22 ii) having a Peel Adhesion Failure Temperature (“PAFT”) of greater than or equal to
23 90°F;
24 iii) having a Shear Adhesion Failure Temperature (“SAFT”) of greater than or equal
25 to 200°F.; and
26 iv) exhibits 100% paper tear at 120°F.

27 20. The cellulosic article of Claim 16 wherein in the hot melt adhesive composition;

28 A) the homogenous ethylene/α-olefin interpolymer is characterized by having:

- 29 i) a density of from about 0.894 to about 0.910 g/cm³;
30 ii) a number average molecular weight (Mn) of from about 1,100 to about 5,300; and
31

iii) a Brookfield Viscosity (measured at 300°F) of from about 1,600 to about 3,200 cP; and

B) the hot melt adhesive composition is characterized by:

- i) having a Brookfield Viscosity (measured at 350°F) of from about 700 to about 1,200 cP;
 - ii) having a Peel Adhesion Failure Temperature (“PAFT”) of greater than or equal to 90°F;
 - iii) having a Shear Adhesion Failure Temperature (“SAFT”) of greater than or equal to 200°F.; and
 - iv) exhibits 100% paper tear at 140°F.

12 21. The cellulosic article of Claim 17 wherein in the hot melt adhesive composition:

13 A) the homogenous ethylene/α-olefin interpolymer is an interpolymer of ethylene and one or more
14 C₃-C₃₀ α-olefins; and

15 B) the one or more tackifiers is selected from the group consisting of aliphatic hydrocarbon resins,
16 hydrogenated hydrocarbon resins, C₅ aliphatic or aromatic hydrocarbon resins or an aromatically modified
17 C₅ aliphatic or aromatic hydrocarbon resins and combinations thereof.

19 22. The cellulosic article of Claim 19, wherein in the hot melt adhesive composition:

20 A) the homogenous ethylene/α-olefin interpolymer is an interpolymer of ethylene and one or more
21 C₃-C₃₀ α-olefins; and

22 B) the one or more tackifiers is selected from the group consisting of aliphatic hydrocarbon resins,
23 hydrogenated hydrocarbon resins, C₅ aliphatic or aromatic hydrocarbon resins or an aromatically modified
24 C₅ aliphatic or aromatic hydrocarbon resins and combinations thereof.

26 23. The cellulosic article of Claim 17, wherein in the hot melt adhesive composition:

27 A) in the homogenous ethylene/α-olefin interpolymer, the α-olefin is selected from the group
 28 consisting of from C₈ (1-Octene); C₁₀ (1-Decene), C₁₂ (1-dodecene), C₁₄ (1-duodecene), C₁₄ (1-tetradecene),
 29 C₁₆ (1-hexadecene), C₁₈ (1-octadecene), C₂₀₋₂₄₊, C₂₄₋₂₈ and C₃₀ and combinations thereof; and

30 B) the one or more tackifiers is characterized as having an acid number between 0 to and
31 about 25.8.

- 1 24. The cellulosic article of Claim 19, wherein in the hot melt adhesive composition;
- 2 A) in the homogenous ethylene/α-olefin interpolymer, the α-olefin is selected from the group
3 consisting of from C₈ (1-Octene); C₁₀ (1-Decene), C₁₂ (1-dodecene), C₁₄ (1-duodecene), C₁₄ (1-tetradecene),
4 C₁₆ (1-hexadecene), C₁₈ (1-octadecene), C₂₀₋₂₄₊, C₂₄₋₂₈ and C₃₀ and combinations thereof; and
5 B) the one or more tackifiers is characterized as having an acid number between 0 to and
6 about 25.8.
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- 8 25. The cellulosic article of Claim 16, wherein the hot melt adhesive composition further comprises one
9 or more compounds chosen from the group consisting of stabilizers, plasticizers, fillers, antioxidants,
10 preservatives, synergists, dyes, and pigments.
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- 12 26. The cellulosic article of Claim 17, wherein the cellulosic article is selected from the group
13 consisting of corrugated cardboard, kraft paper, linerboard, and paper.
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- 15 27. The cellulosic article of Claim 19, wherein the cellulosic article is selected from the group consisting
16 of corrugated cardboard, kraft paper, linerboard, and paper.
- 17

- 1 28. A method of producing a polymer composition comprising admixing:
- 2 an amount of from about 40 to about 100 percent by weight (based on the final weight of the
- 3 polymer composition) of a homogeneous ethylene/α-olefin interpolymer; and
- 4 an amount of from 0 to about 60 percent by weight (based on the final weight of the polymer
- 5 composition) of a tackifier.
- 6
- 7 29. The method of producing a polymer composition of Claim 28, wherein
- 8 A) the homogenous ethylene/α-olefin interpolymer is present in an amount of from about 60
- 9 to about 85 percent by weight (based on the final weight of the polymer composition) and the homogenous
- 10 ethylene/α-olefin interpolymer is characterized by having:
- 11 i) a density of from about 0.880 to about 0.930 g/cm³;
- 12 ii) a number average molecular weight (Mn) of from about 1,000 to about 9,000; and
- 13 iii) a Brookfield Viscosity (measured at 300°F) of from about 500 to about 7,000 cP
- 14 and
- 15
- 16 B) the one or more tackifiers is present in an amount of from about 15 to about 40 percent by
- 17 weight (based on the final weight of the polymer composition); and wherein
- 18 C) the polymer composition is characterized by having:
- 19 i) a Brookfield Viscosity (measured at 350°F) of from about 400 to about 2,000 cP;
- 20 ii) a Peel Adhesion Failure Temperature (“PAFT”) of greater than or equal to 110°F;
- 21 and
- 22 iii) a Shear Adhesion Failure Temperature (“SAFT”) of greater than or equal to
- 23 140°F.
- 24
- 25 30. The method of producing a polymer composition of Claim 28, wherein:
- 26 A) the homogenous ethylene/α-olefin interpolymer is characterized by having:
- 27 i) a density of from about 0.893 to about 0.930 g/cm³;
- 28 ii) a number average molecular weight (Mn) of from about 1,000 to about 6,000; and
- 29 iii) a Brookfield Viscosity (measured at 300°F) of from about 1,500 to about 5,000
- 30 cP; and
- 31 B) the polymer composition is characterized by:

- i) having a Brookfield Viscosity (measured at 350°F) of from about 400 to about 1,400 cP;
- ii) having a Peel Adhesion Failure Temperature ("PAFT") of greater than or equal to 90°F;
- iii) having a Shear Adhesion Failure Temperature ("SAFT") of greater than or equal to 200°F.; and
- iv) exhibits 100% paper tear at 140°F.